RECIPROCITY

Editor, F. H. Meyer
146 Ross Hall
University of Wisconsin
Superior, WI 54880

Published by NEW SCIENCE ADVOCATES, an organization devoted to promoting the Reciprocal System of physical theory.

Secretary: Ronald W. Satz
4010 N. War Memorial
Apt. 1008
Peoria, Ill. 61614

Vol. V, No. 3 October, 1975

SYMMETRY BETWEEN THREE-DIMENSIONAL TIME AND SPACE

The substance of the following report will be presented by Professor Frank H. Meyer to a meeting of the Minnesota Area Association of Physics Teachers November 14, 1975 at the Mathematics and Science Auditorium, St. Cloud State College.

New Inquiry About Time

A new ambitious book about physical time has been published. It merits some attention from readers of RECIPROCITY Its author is P.C.W. Davies, a competent physicist. The title of his book is "The Physics of Time Asymmetry" (University of California Press, 1974).

Dr. Davies' book brings out into the open what he calls the "great confusion and misunderstanding surrounding the topic" of physical time among modern physicists and philosophers. This is the book's most valuable contribution. It is a step forward from a period and position of complacency. In this position modern physicists, following Einstein, redefined physical time as obviously that what you measure with a clock. Davies himself keeps the faith, adopting this quite questionable orthodox view that physical time can be adequately defined operationally as what a clock measures.

Older Views of Time

No account is taken by Davies of a profounder and truer view of physical time. An early American scientist, Benjamin Franklin, expressed the view in his Autobiography that "it (time) is the stuff life is made of".

Although time will not be found listed as one of the elements in the Periodic Table of Elements, Franklin's definition of time is a more satisfactory physical definition than Einstein's operational definition. After all, are not radiation and matter as well as life made of time and space, that is, made of MOTION? You see, adherents of the Reciprocal System of theory do not subscribe to the orthodoxy that MOTION or SPACE-TIME is a mere attribute of matter and/or radiation.

Nor is any account taken by the Davies' book of a more contemporary system of theory about the structure of time. This is the Reciprocal System of theory about the space-time progression and about physical motion. Such a theory, first proposed in 1959, has been published by Dewey B. Larson of Portland, Oregon.

The Larson theory offers a different and, we think, the best solution to current problems of time, including the question of an alleged symmetry of time.

Past and Future and Question About Symmetry of Time

On page 1 of the Davies' book the question is asked:

> "How is it possible to account for the difference between past and future when an examination of the laws of physics reveals only the symmetry of time?"

But is it in order to speak about 'the symmetry of time' in this connection rather than the symmetry of the laws of physics? The symmetry that Davies sees in relation to 'the laws of physics' appears to be a property of these laws, and not of time. The equations of motion, for example are symmetrical with reference to time, but this does not imply any symmetry of time itself.

The phrase 'Time Asymmetry' in the title of the Davies' book does not mean that the author thinks that time as such is asymmetrical. Davies explicitly denies time asymmetry in this connotation and postulates only symmetry of time itself.

Davies means by 'time asymmetry' something quite other than that time itself is in any sense asymmetrical. 'Time Asymmetry' means to Davies that the physical universe, interpreted as a universe of matter and radiation, somehow must be asymmetrical with reference to time, so that the structural difference between the universe facing the future and the universe facing the past can be comprehended. Included in the Davies' concept of 'time asymmetry' is the non-existence in the physical universe of any moving present moment.

RECIPROCAL SYSTEM INTERPRETATION OF TIME ASYMMETRY

According to the Reciprocal System of D. B. Larson, physical time is asymmetrical with respect to positive and negative temporal directions just as physical space is asymmetrical with respect to its outward and inward spatial directions.

The Reciprocal System postulates that the physical universe is made entirely of one component, MOTION, existing in three dimensions, in discrete units and in two reciprocal forms, TIME AND SPACE.

It follows that space-time is an outward, scalar, uniform progression at the rate of one natural unit of space to one natural unit of time, equivalent to 300,000 kilometers/second. Space-time thus possesses movement and intrinsic orientation. Space increases with increasing time and time increases with increasing space. The space-time progression is, in fact, responsible for the fact that we live in a constantly expanding universe.

The distinction between past and future in the Reciprocal System of Larson results from the fact that in a universe of motion the natural reference system from which all physical systems extend is a MOVING system (the space-time progression). Except as modified by gravitation, separations, both in space and in time, are continually increasing. It follows that in the material sector of the universe, where gravitation acts in space, time magnitudes are not reversible.

SOURCES AND ROOT OF ERROR ABOUT TIME STRUCTURE

The misguided conception by Davies about 'the symmetry of time' logically follows from the basic assumptions of relativistic physics about time and space, some of which are not true.

In fact, about the only axioms of relativity theory which appear to be unquestionably true are the two following:

1. Physical space is three-dimensional.
2. Space and time are distinct but inseparable.

The following assumptions of relativity theory in any case appear to be definitely in error:

3. Physical space is a continuum and not discrete.
4. Physical time is a continuum and not discrete.
*5. Time is one-dimensional and symmetrical.
6. Space-time forms a 4-dimensional continuum.
7. The space-time continuum is immovable.
8. Motion is essentially nothing but an attribute of matter and radiation; (only things move).
9. The physical universe is a universe of matter and radiation.
10. Clock time is not one component but all of time.
11. The physical universe exists prior to time and space, which are mere forms of the existence of matter and radiation.

*Adherents of relativity theory are divided over accepting axiom 5, not on the issue of its 1-dimensionality but on the issue about 'the symmetry of time'. The 'symmetry of time' means in other language that physical time as such is WITHOUT DIRECTION, movement, arrow, intrinsic orientation, that is WITHOUT ASYMMETRY This is a novel but not necessarily illogical nuance of relativistic theory. However, an early exponent of relativity theory pronounced on the contrary that "...we shall assume without examination.... the UNIDIRECTIONAL, one-valued, one-dimensional character of the time continuum." (R. C. Tolman, Theory of the Relativity of Motion, U. of Calif. Press, 1917, p. 27)

Dr. Davies has been insufficiently critical not only of the relativistic physics of Einstein but also of the non-relativistic physics of Newton. Both men tacitly rejected the insight of Aristotle that time is nothing essentially but a numerable aspect of MOTION. Both men believed that physical time and physical space are not merely distinguishable from physical MOTION, but SEPARABLE from MOTION. Newton explicitly supposed space to be IMMOVABLE and adopted the view of his teacher, Isaac Barrow, that 'the flow of time' is unrelated to physical MOTION. Einstein imagined that time and space are united in an UNMOVING, UNBOUNDED FINITELY EXTENDED CONTINUUM. Dr. Davies has been led ineluctably to repeat the blunder of both Einstein and Newton in thinking of PHYSICAL TIME APART FROM PHYSICAL MOTION.

A consequence of this blunder is the reduction of MOTION to the status of a mere property of matter. Those who accept the corollary that empty space-time is NOT MOTION, that TIME AS SUCH (OR SPACE) is WITHOUT DIRECTION are misinformed. They are mistaken when and IF thinking that ONLY things can MOVE. Just as mistaken as Isaac Newton was in believing that physical time and physical space are SEPARABLE as well as DISTINGUISABLE from EACH OTHER.

It took an Einstein to open our eyes to the view that after examination the scholium about the separability of time and space cannot be tenable and supported.

Now it is regretable but true that Albert Einstein did NOT also see that the physical universe is a UNIVERSE OF MOTION and that physical time and physical space are not only INSEPARABLE from EACH OTHER but also INSEPARABLE FROM EACH AND EVERY PHYSICAL MOTION AND NON-PHYSICAL MOTION.

Reciprocity Theory of Symmetry BETWEEN Time and Space

Symmetry BETWEEN time and space is an unfamiliar corollary of D. B. Larson's Reciprocal System of physical theory. It means that time and space can and do freely exchange roles in constructing complementary physical entities, such as electrons and positrons, hydrogen (or neutron?) and ψ3695, photons and inverse photons, gold and co-gold, etc.

Larson postulates that the physical universe is made of one stuff or quintessence: MOTION, existing in three dimensions, in discrete units and in two reciprocal forms: TIME and SPACE.

He further postulates that this physical universe behaves according to ordinary mathematics, including probability calculus; that its magnitudes are absolute and its geometry, Euclidean.

Symmetry BETWEEN time and space follows from the reciprocal or inverse relation BETWEEN space and time in motion. More time and less space means slower motion. Less time and more space means faster motion.

Symmetry BETWEEN time and space follows also from the fact that, according to Larson's postulates, time is as inseparable from motion as it is from space. Space and time are the two necessary and sufficient conditions of motion and for motion to occur. Although opposites and therefore distinguishable, space and time are united as motion. They are so discretely equivalent as to be almost, if not quite identical, playing readily exchangeable roles because of their inseparability. It is like Bette Davis in a movie about identical twin sisters, managing to play both roles, exchanging one for the other, because they are so alike, while remaining so different as to be opposites.

The Larson postulates also imply that time and space are infinite and that as a consequence of their reciprocal relations, infinite time means zero space, while infinite space means zero time. Thus, adherents of the reciprocity theory, while examining structural distinctions between past and future from the present, do not become preoccupied with specious problems of the beginning and end of the physical universe. The latter always continues to exist as time and space or motion does.

For the world to be constructed out of mothing but time and space, a difference between time (or space) as a constituent of the space-time progression and time (or space) as an isolated entity is indicated. The only such difference permitted by Larson's postulates is a difference of DIRECTION. The theory implies that space-time is SCALAR, while DIRECTION is an attribute of time and space individually. Then time as such, like space itself, is WITHOUT symmetry, since it is NOT without intrinsic orientation and direction. Time as such, like space itself, is 3-dimensional and ASYMMETRIC.

Symmetry BETWEEN time and space should not be understood as implying 'symmetry OF time' or 'symmetry OF space'; i.e. that time (or space) is symmetrical with reference to positive or negative directions.

Motion cannot take place coincidentally in space and in time; it has to be either the one or the other (except motion at unit speed, physical zero, which, from the natural standpoint is no motion at all.)

When analyzing motion in space, time is properly treated as a scalar; motion relative to space is represented by a vector. This is because time has no dimensions and no direction IN space.

However, when analyzing motion in time, space is properly treated as a scalar; motion relative to time is represented by a vector. This is because space has no dimensions and no direction IN time.

Can a person return to the scene of a past event?

In the light of the Reciprocal System of theory the answer is no.

Americans now living, for example, cannot return to the scene of creation of the original draft of the Declaration of Independence, sometime in 1776 somewhere in Philadelphia. By means of motion in space we can return to the place where the event happened, but we cannot reach that place at the time of the event. We can get there only at some later time. Similarly, by means of motion in time (if we were able to move at a speed in excess of that of light) we could return to the time of the event, but only at some distant place. Nor would we accomplish the objective if we followed a motion in space by a motion in time. This would put us both at a later time and at a distant place. There is no way by which we can get back to the place of the creation of the Declaration of Independence at the time of this momentous event. This is simply because time as such, like space itself, is ASYMMETRIC with respect to past and future.

Physicists should discard the confounded, obsolete, relativistic conception of a symmetric, unmoving time-space continuum in favor of the explanation of time asymmetry, afforded by the tried and tested Reciprocal System of physical theory

NSA INCORPORATION

NEW SCIENCE ADVOCATES, publisher of RECIPROCITY, will be incorporated in the State of Utah through the good offices of Dr. Rainer Huck, member of the Executive Board of NSA. Responding to a request printed in a previous issue of RECIPROCITY for suggestions about facilitating this step vital to the growth of our movement, Dr. Huck conferred with an attorney friend, who has agreed to offer us the necessary legal aid for a nominal fee.

In 1976, the Bicentennial year of the American Revolution, culminating in the creation of the Declaration of Independence, we should be capable not only of maintaining but also of increasing the quality and circulation of RECIPROCITY.

SOME ANNIVERSARY THOUGHTS

This issue of Reciprocity marks its fourth anniversary, and provides a suitable occasion on which to make some comments with respect to the progress that has been made toward the objective that was defined in the first issue: promotion of understanding of the Reciprocal System of physical theory. The most serious obstacle in the way of a new theory in any field is the prevailing tendency to dismiss it summarily on the ground that the a priori probability of its being correct is too low to justify taking the time to examine it. In the sixteen years that have elapsed since the first publication of the theory, and particularly in the four years that Reciprocity has been in existence, much of this initial handicap has been overcome. While unwillingness to consider the theory on its merits is still our biggest problem, there is a growing awareness that no serious arguments have thus far been advanced against it. Consequently, there is an emerging tendency, especially in foreign countries, to regard it as a legitimate competitor of currently accepted physical thought, and to recognize its extraordinary potentialities. As expressed in the long review of Quasars and Pulsars that was reprinted in the April 1974 issue of Reciprocity, "If it (the Reciprocal System) does (stand the test of time) the physicists will find in it their long-cherished desire, viz., one comprehensive theory with universal applicability".

This review from the Indian Journal of Physics is one of the best available tools for use by those who want to get friends and associates interested in the theory, and if any readers would like to obtain a quantity of copies for distribution, a good supply is still available. They can be obtained free of charge either from me or from Professor Meyer.

In view of the amount of progress that has been made, I believe we are now in a position to take a somewhat more agressive attitude, and to emphasize that the Reciprocal System complies fully with the basic requirement of science -- agreement with observation and measurement -- whereas so-called "modern" science no longer does. "If it disagrees with experiment it is wrong", says Richard Feynman. "In that simple statement is the key to science". But present-day scientists have been frustrated in their attempts to explain recently discovered phenomena in terms of theories that agree with the observed facts, and because they feel that they must have some kind of an explanation in each case, they have abandoned the traditional requirement that Dr. Feynman sets forth in the foregoing quotation. In my publications I have pointed out a great many places where present-day physical and astronomical theory violates this principle that is the "key to science", and resorts to one evasive device after another to conceal the failure to meet established scientific standards.

The currently accepted nuclear theory of atomic structure is a good example. According to the theory, the atom has a "nucleus" composed of protons and neutrons. If we go entirely by what we know, and require our theories to agree with known facts, the nuclear theory must be rejected because our observations show that (1) protons repel each other, and (2) neutrons only live about 15 minutes. But the theorists have taken the stand (which they call unscientific when anyone else relies upon it) that the known facts do not apply where they are in conflict with this theory. In order to "save" the theory they have assumed, entirely ad hoc, that there must be a "nuclear force" holding the protons in place (the modern equivalent of the "angels" or "demons" that early-day scientists postulated when faced with similar situations), and that the neutrons must have an indefinitely

long life when they are inside the atom. There is not the slightest independent evidence that either of these assumptions is valid. In essence, they amount to nothing more than assertions that for the purposes of the nuclear theory these particular conflicts with observation must be disregarded.

It is now appropriate, in my estimation, to begin laying more stress on the fact that there are no ad hoc assumptions in the Reciprocal System. Indeed, there are no assumptions at all other than the assumptions that define the theory: those that are contained in the two fundamental postulates. Nor does anything that has thus far been definitely deduced from the basic premises of the theory conflict with any definitely known facts. Here is a theoretical system that is in full compliance with the fundamental scientific requirement stated by Dr. Feynman: a requirement that "modern" physical theory is far from being able to meet.

D. B. Larson

QUESTION BOX

Ronald W. Satz

Question: How can two photons from separate sources meet if their space-time locations are moving away from each other with the space-time progression? W. J. Mitchell, Dearborn, Michigan; G. Windolph, Quincy, Illinois.

Answer:

1. The essential point here is that if an object is in motion relative to a stationary reference system, and acquires an additional motion, this new motion does not replace the previously existing motions; it adds to them.
2. A completely free object is moving outward from all other such objects by reason of the space-time progression (Motion I). Two such objects having no other motions therefore cannot collide.
3. Gravitationally bound objects without independent motions are likewise moving outward from all other similar objects (Motion I), but coincidentally are moving inward toward all of these objects at the same rate of speed, by reason of gravitation (Motion II). Two such objects maintain the same separation, and therefore cannot collide.
4. An object A in a gravitationally bound system may acquire an independent motion in any direction (Motion III). The sum of all three of the motions of this object (equal to its independent motion) may then carry it to a point where it will collide with a similar object B.
5. A photon released from object A participates in all three of the motions of that object, and inasmuch as it is not under any restraint in the dimensions perpendicular to the direction of Motions I and II, it is also moved outward at unit speed in one of these dimensions by the space-time progression (This motion can be in any direction relative to the reference system, as the gravitational motion is random). The second progression is Motion IV; that is, it is an addition to all of the other three motions. The net resultant of all four motions is a combination of Motion III and Motion IV. If object A maintains the same speed and direction, the motion of the photon, as seen in the context of a stationary reference system, is directly outward from object A. The emitted photon may therefore collide with any object B in the gravitational system, or with a photon emitted from object B.

RECIPROCITY
Editor: F. H. Meyer
University of Wisconsin-Superior
146 Ross Hall
Superior, Wisconsin 54880